Contribution ID: **112** Type: **Invited Oral**

Practical model for AVDE loads calculations

Friday 6 September 2024 09:00 (40 minutes)

The talk begins with an overview of several consequent steps in evaluation of the pulsed EM loads in tokamaks and concentrates on calculation of AVDE-induced loads in ITER. The presented practical EM model uses the superposition of two patterns of the halo current: one perfectly symmetric and another perfectly antisymmetric. It combines the following features of two recent trial models: (a) helically distorted halo layer wrapping around core plasma, and (b) halo-to-wall interception belts slipping along plasma-facing walls. This combination, not tested before, almost doubles the lateral net forces in comparison with ones found with trial models. Any AVDE creates not only lateral net forces but also significant lateral net moments. Being negligible at VDEs, these moments become dominant at AVDEs. The model carefully compensates any numerically accumulated imbalance of net EM forces and moments between the VV and the Magnets (zero total for the tokamak), as a necessary condition for the consequent simulation of tokamak's dynamic response and for the testing of tokamak monitoring algorithms and simulators. To decouple from the current uncertainties in the interpretation, prediction, and numerical simulation of AVDE physics, the model does not attempt to simulate plasma evolution with AVDE distortion but takes it as input assumption based on the existing interpretations of AVDE physics. This means the model is to be used in a manner of parametric study, at widely varied input assumptions on AVDE evolution and severity. Parametric results will gradually fill a library of ready-for-use waveforms of asymmetric loads (distributed and total), and then the physics community may point out specific cases for subsequent engineering analysis. This talk shows the first practical contribution to the AVDE library.

Speaker's title

Mr

Speaker's email address

sergey.sadakov@iter.org

Speaker's Affiliation

ITER Organization (Emeritus Fellow) Saint Paul lez Durance

Member State or IGO

France

Primary authors: Mr IGLESIAS, Daniel (ITER IO); Prof. VILLONE, Fabio (DIETI/CREATE, Università Degli Studi di Napoli Federico II); Prof. RUBINACCI, Guglielmo (DIETI/CREATE, Università Degli Studi di Napoli Federico II); Mr ALMENARA-RESCALVO, Jesus (Esteyco Mechanics); Dr MAQUEDA, Luis (Esteyco Mechanics); SADAKOV, Sergei (ITER IO (Emeritus Fellow)); Prof. VENTRE, Salvatore (DIETI/CREATE, Università Degli Studi di Cassino e del Lazio Meridionale)

Presenter: SADAKOV, Sergei (ITER IO (Emeritus Fellow))

Session Classification: Consequences

Track Classification: Consequences